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greater proportion of light and heat which the southerly half receives, would give that side of the tree an advantage over the northerly half." In corroboration of this hypothetical explanation of Dr. Stearns, we may record the statement of Professor Budd, of Iowa, that in trees grown upon the prairies the thickness of wood is always greater upon the north side of the trunk than upon the south side. We shall be glad to hear from our correspondents upon this point.

A CLIMBING POLYPODIUM has been detected by that excellent botanical collector, A. H. Curtiss, on Key Largo. The species is probably *Polypodium Swartzii* Baker, and its discovery is a most interesting one, giving another fern to Florida, and carrying our list of North American ferns up to 156.

Subscribers for Mr. Curtiss' plants will be glad to know that he has not only collected enough of the new fern to supply all of his sets, but that he has also collected fine specimens of *Asplenium serratum* as well.

Soon after an Ophioglossum, which proves to be *O. nudicaule* L. fil., collected by Dr. Parry, came to hand from California, adding another species to the flora of that State.—*G. E. Davenport.*

ZOÖLOGY.

THE OCCURRENCE OF MEPHITIS INTERRUPTA RAFINESQUE IN NORTH CAROLINA. — During the past summer I spent several weeks in the neighborhood of Roan mountain, N. C., an interesting region to any one having a taste for natural history matters. Here I found the *Pitys bryanti* Harper, the *Margaritana ravenelliana* Lea, the rare new Helices recently described by Mr. Binney, and last, but not least, here I killed and skinned a fine specimen of the rare *Mephitis interrupta* Rafinesque.

The synonymy of this species is fully set forth in Dr. Coues' Fur-bearing animals, which he heads *Mephitis* (*Spilogale*) *putorius* (L.).

Speaking of Rafinesque's claims to the species he says: "The *Mephitis interrupta* of Rafinesque may or may not have been "a pure figment of his imagination." It probably, however, had some basis, and even if his account does not wholly agree with specimens of *Spilogale putorius* examined, it will be remembered that even his elastic imagination would be put to the stretch to describe a spotted and striped skunk in terms too exaggerated to be met by the reality which this species offers. We may accept his name as undoubtedly belonging here, and in fact we should adopt it, as a more definite appellation than Zorilla, were it not anticipated by Linnæus as just shown."

Dr. Coues, in a recent letter to me, says, "the species undoubtedly belongs to Rafinesque."

It is a well-known fact that Rafinesque was, for a long time, Professor of Natural History in the old Transylvania University at Lexington, Kentucky. He made frequent excursions on foot through the wildest portions of the State, in pursuit of his favorite studies. As this little animal occurs so far north in the Appalachians as the northern line of North Carolina, it is within the range of Rafinesque's explorations without a doubt. He had doubtless seen it often, and if he may have mixed localities in regard to this animal, it is no more than all early students of our fauna did, and none to a greater extent than those who have been his most uncompromising critics.

This skunk is said by the inhabitants to be quite common at Roan, although this is the only one which I saw. The *M. mephitica* also occurs, and a semi-melanotic variety of the *Sciurus hudsonicus.* This beautiful little squirrel is less reddish than the northern variety, has a white belly and the lower half of the body, on each side, between the fore and hind legs, and shading off on the hips and shoulders, very dark—nearly black in well-marked specimens. It is considerably larger than the northern "pine squirrel," but has the same habit of choosing evergreen trees for its abode. The native people call it the "mountain boomer."—*A. G. Wetherby.*

NOTE ON GADINIA EXCENTRICA TIBERI.—Twelve years ago I pointed out that this species was probably not a Gadinia, and did not belong to the Pulmonata, but until recently I had never seen a specimen. One just sent by Dr. J. Gwyn Jeffreys from the Mediterranean proves on examination to be a species of Addisonia (Rhiphidoglossa) closely allied to if not identical with the *A. paradoxa* Dall, recently described from the deep sea bed off the coast of New England. The close resemblance or identity of so many Mediterranean recent and Pliocene Italian forms with those living in the deep sea, is one of the most interesting features of geographical distribution.—*W. H. Dall.*

MOLLUSCAN NOTES.—On August 26, 1880, I found in the Hudson river, near Catskill landing *Lioplax subcarinata* Say, quite abundant. This I think is a new locality for this species.

On Sept. 22, 1881, I found *Littorina littorea* Linn., on rocks at Lloyds Neck, Queens county, Long Island. I believe this to be the first taken on the Long Island side of the sound.—*Henry Prime.*

HABITS OF THE WOODCOCK.—While out hunting Wilson's snipe, April 1, a specimen of American woodcock *(Philohela minor)*, was flushed from a clump of persimmon trees on the border of a slash. Knowing that the bird has the habit of rising above a clump of bushes and then suddenly dropping behind it out of range, and also aware of its rapid movements, I fired as soon as it rose in view. When the smoke cleared away I observed my bird slowly rising with laborious flight and concluded it was wounded and expected to see it fall. (It is not uncommon for birds shot through the heart to rise quite high in the air and then suddenly drop dead.) When up about a rod high the bird turned and flew near me. My attention was called to something it seemed to be holding between its feet, and so heavy that its flight was slow and clumsy like that of a rapacious bird with heavy prey. By close observation I was convinced that the bird was transporting its young, as I could distinctly see the little fellow (about the size of a young chicken just hatched), located between its mother's legs and supported by her feet placed on its sides. I became so interested in watching this habit, entirely novel to me, that I forgot to fire the other barrel until the bird was out of range, and then I felt that a bird showing such love of offspring ought to go free. So slow was the flight that by taking a brisk trot I was able to gain on the bird, and tried to tire it out and make it drop its precious burden, but its pluck was greater than my wind. After chasing it forty rods or more it started across a cultivated field and kept wing until reaching the other side, when it disappeared in a clump of bushes over one hundred rods from the place it rose.

It seems rather early for woodcock to hatch, but in this region where the winters are open woodcock and Wilson's snipe both remain. I shot a specimen of the former this spring in February and fifteen of the latter about the middle of January.—*F. L. Harvey, Ark. Ind. Univ., Fayetteville, Ark.*

Feline Development.—It seems to me from the many articles I meet with in scientific journals, as well as in the general press, and from my own observations, too, that the cat family are constantly growing in the general estimation in the high qualities of sagacity and affection. In fact, I believe, they stand better than they did forty years ago—all the objurgations of Mrs. Swisshelm, the champion cat-hater, to the contrary notwithstanding. Here is our "Nig," for instance, manifesting a trait altogether new, as it seems to me—in this: he likes to ride as well as a coach dog. He cries almost every day to ride to town in the buggy, and is always ready to go out with the team when we are hauling in hay or grain or husking corn, provided he can ride. If one will hold him in his arms he also delights to ride on horseback. His pleasure is manifested in a remarkable degree whenever he is allowed the luxury of a ride, either in any kind of vehicle or on horseback, and his cries are altogether pitiful when he is told that he cannot go. This singular habit seems to have been a natural one with him, for he never had any special training in that direction. While cats are ordinarily frightened out of their wits by any attempt to give them such a ride, our "Nig" is never so happy as when he is thus indulged. He evidently reasons that if it is a good thing for people to "jump into a wagon and all take a ride," why don't the same rule apply to black cats? He would come pretty near accepting a railroad pass.—*Charles Aldrich, Webster city, Iowa, Jan. 31, 1882.*

DEVELOPMENT OF THE STURGEON AND THE HOMOLOGIES OF THE VERTEBRATE BRAIN.—In a second paper by Salensky on the embryology of the sturgeon, according to the Journal of the Royal Microscopical Society, the author after describing the mode of development of the central nervous system, raises the question of the homology of this region with the nervous system of Vermes and Arthropoda. He points out that (1) the central nervous system of all vertebrates is formed from two thickenings of the ectoderm set parallel to the long axis of the body; that of all articulates has a similar origin. (2) In some cases, *e. g.* Echiurus, the articulates present a median groove comparable to that of vertebrates. (3) The formation of the medullary groove begins, in the case of both phyla, posteriorly, and is continued forwards. On the other hand the Vertebrata have the central nervous system dorsal in position, and the medullary groove becomes closed. As to the first of these, Salensky points out that the position of the mouth is the determining character in conjunction with that of the locomotor organs; these points he looks upon as having less morphological value than the development of the system, and its correlation with other organs during the course of development. The closure of the medullary groove is regarded as being merely the result of further modifications.

If we accept the general homology, we have next to determine how the parts correspond; the author cannot follow Dohrn and Hatschek in regarding the homology as being complete; he looks upon the brain of vertebrates as being a new formation, which is their exclusive property; it merely consists in an elongation and dilatation of the already existing nervous system, or in other words the medulla, which is the analogue of the ventral ganglionic chain of the Articulata.

RECENT PROGRESS IN THE STUDY OF WORMS.—Several papers devoted to the higher worms, of a high order and with excellent illustrations, have lately appeared in Germany. The development of Polygordius and Saccocinus, two low chætopods has been described by Repiachoff. The Gephyrean worms have, however, received special attention. In an elaborate memoir on the Echiurida in the Nova Acta of Halle, by Professor Greef, the anatomy of the group is discussed with fullness, aided by colored drawings of transverse stained sections. The presence of a central canal in the nervous system is noted, and it is suggested that it is a remnant of the ectodermal invagination. A full account is also given of the curiously minute male of Bonellia. The author thinks that there is no close genetic affinity between the

Gephyrea and the Echinodermata, but that the former represents a distinct class allied to the Annelids and divisible into an armed (Echiurida) and unarmed (Sipunculidæ) group. In his elaborate account of the anatomy of *Sipunculus nudus*, Dr. Andreæ (*Zeits. Wissen. Zoologie*, XXXVI, 1881) expresses similar views as to the relations of the Gephyreæ.

On the other hand, Dr. Vejdovsky has studied very carefully Sternaspis, a form intermediate between the Gephyrea and Chætopods. His memoir appears in the Denkschriften of the Vienna Academy. He concludes that there are four natural orders of the class Annelides: 1. *Hirudinea;* 2. *Oligochæta; Polychæta;* and 4. *Gephyrea.* He derives the first two from the Discodrilida, and the other two from Sternaspis; the Discodrilida he considers form an offshoot from the Oligochæte stem, which descends into the Amedullata, which, with Sternaspis, have their common origin in the Turbellaria, which in turn are derived from the Cœlenterates. He also believes that the larvæ of the Chætopods and Gephyrea are formed on the same type, and that in Echiurus there is a true segmentation of the body.

NERVOUS SYSTEM IN TAPE-WORMS.—The Cestodes, or tape-worms are usually described as having no nervous system. On investigation by transverse sections, Dr. A. Lang finds in the Tetrarhynchi a band-shaped cerebral mass with two longitudinal trunks which arise from the brain, and which give off lateral branches, the separate fibers of which enlarge here and there into very long and large ganglion cells. In Amphilina, an unjointed Cestode, the nervous system has a not inconsiderable resemblance to what obtains in the Trematoda.

Finally, says the Journal of the Royal Microscopical Society, Dr. Lang sums up the state of our knowledge as to the nervous system of the other Cestoda. *Tænia perfoliata* has a better developed nervous system than the rest of the Tæniadæ; the anastomosis or cerebrum contains nuclei and fibrils, gives off two lateral primary trunks, and completely resembles in structure the same parts in the Nemertinea. *Tænia solium*, with others, has three cords on either side. In the Bothriocephalida the water vessels are on the outer side of the longitudinal nerves, and here also the anastomosis is concave anteriorly; in the Ligulida the connecting commissure forms a pretty broad bridge, the lateral trunks lie outside the water vessels, and are approximated towards one another in the anterior region of the body.

SIMROTH'S NERVOUS SYSTEM AND LOCOMOTION OF GERMAN LAND AND FRESH-WATER MOLLUSKS.—This important article appears in the programme of the Realschule of the second order at Leipzig, and is an able discussion of the principal types of nervous system in these mollusks, with remarks on the physiology of locomotion. The plate is an excellent piece of work.

ZOOLOGY IN FRANCE.—The late numbers of Lacaze-Duthier's Archives de Zoologie contain some notable essays. Perrier's studies on the earth worms, made use of by Darwin in his last work on the earthworm, is beautifully illustrated by chromolithographs, the French maintaining their reputation for exquisite illustrations and delicate anatomical dissections. Numbers of the Acinetæ are described and illustrated by E. Maupas, while the notes on the anatomy of the brain of the mole, by W. Vignal, is accompanied by excellent figures. A. Schneider describes and figures a number of new psorosperms, while Dr. Yung discusses the innervation of the heart and of the action of poisons on the lamellibranchiate mollusks. The last number issued (No. 4, 1881) contains elaborate studies on the Pycnogonids, with several plates, by Dr. Hoek.

Milne-Edwards' *Annales des Sciences Naturelles* contains a summary of Mr. Walcott's work on the trilobite, by the venerable H. Milne-Edwards, who concludes that the trilobites are Crustacea, while he regards Limulus and the Merostomata in general as Arachnids. He accepts Walcott's determination of the nature of the limbs of trilobites. The same number also contains Robin's elaborate memoir on bats, with a figure of an embryo bat, and besides other papers, a second installment of A. Milne-Edwards researches on the fauna of the southern regions, concerning the distribution of the albatross, etc.

DEVELOPMENT OF THE PAIRED FINS IN SHARKS AND SKATES.—The latest contribution to this subject is that of Professor Balfour, who states that in Scyllium these arise as slight longitudinal ridge-like thickenings of the ectoderm. Afterwards the fins become a ridge of mesoblast covered by epiblast (ectoderm); the embryonic muscle-plates grow into the bases of the fins, and form two layers, while in the intermediate indifferent mesoblast changes begin which give rise to the cartilaginous skeleton. There is thus formed in the fin a bar, which springs at right angles from the posterior side of the pectoral or pelvic girdle, and runs parallel to the long axis of the body. The free end of this bar begins to undergo segmentation into rays. We have then a longitudinal bar along the base of the fin, which gives off perpendicularly a series of rays which pass into the fin. The resemblance to the arrangement of the unpaired fins is consequently very striking, and support is given to the author's original doctrine of a once continuous lateral fin.

MR. STEARNS ON VARIATION IN AMERICAN PLANORBES.—Apropos of Mr. Hyatt's article in the June number on the evolution of Tertiary species of Planorbis, we have in the Proceedings of the Academy of Natural Sciences, Phila., 1881, a most interesting paper by Mr. Stearns: (1) as to whether the shells of Planorbis are dextral or sinistral, and (2) on certain aspects of variations in American

Planorbes. The larger so-called species of Planorbis are divided into two groups. *First*, those in which the whorls are rounded; that is to say if the tube or cone, as represented in the preceding part of the paper, was cut transversely, the section would show a rounded (not round) outline. Examples are the typical *P. corneus* L. of Europe, *P. guadaloupensis* Sby., *P. subcrenatus* Carp., and *P. tumidus* Pfr. of Nicaragua, a quite persistent form, not, however, quite as rounded as the others. *Second*, those in which the whorls are either planulate, angulated, carinated or sub-carinated, which includes most of the larger North American species: examples are *P. corpulentus* Say, *P. traskii* Lea, *P. occidentalis* Carp. and *P. bicarinatus* Say. In these the tube, if cut transversely, would present an outline more or less angulated. Forms like *P. trivolvis* connect the two groups, for while in some instances this species exhibits the rounded whorls of the first it imperceptibly differentiates from the above to obtuse angulation, and thence to the sub-connate forms of the second group. Further remarks in illustration, with references to variations in other species, follow.

RESEARCHES ON THE COMPARATIVE STRUCTURE OF THE CORTEX CEREBRI.—In the Philosophical Transactions of the Royal Society of London for 1880, Dr. W. B. Lewis details the results of a full investigation into the minute structure of the cerebral cortex in the pig, with notes upon the histology of the same structure in the sheep and cat, with a view of comparison between the brains of these animals and that of the highest members of the mammalian series. The general arrangement of the cells constituting the greater portion of the cortex of the brain of the pig, is very similar to that found in the highest Mammals, and the cortex of the sheep closely resembles that of the pig. Among the chief facts of interest elicited are the following: A five and six laminated cortex is found in all, the fundamental structure of the layers is similar, and divergence in type is induced through the varied character and distribution of the units of these layers. Variations in laminar type, whether in man or the lower animals, center about the mid-region of the cortex; and motor areas are characterized by a five-laminated cortex and nested cells. In the cat the cells of the third layer increase in size with their depth, and the ganglionic cells are very large and crowded around the crucial sulcus—this concentration is a feature of importance in the Carnivora, and distinguishes them from the pig and sheep, in which the ganglionic cells are widely spread and uniform; and from man and the apes, in which they are widely spread and varied in development. The ganglion cells of the sheep and pig differ wholly in type from those of the higher mammals, and approach closely in appearance the large pyramidal cells of the third layer in man and the ape.

CONCLUDING OBSERVATIONS ON THE LOCOMOTOR SYSTEM OF MEDUSÆ.—Mr. G. J. Romanes has, by his experiments upon Medusæ, done much to explain the nature and origin of nerve action. It is in the Medusæ that we have the first observed appearance, in the ascending scale of life, of both muscular and nervous elements, and fortunately the creatures exhibit much endurance under experimentation, and are, many of them, of considerable size. A startling result of Mr. Romanes' labors, is his conclusion that ganglionic action is not, by itself, adequate to explain rhythm. Rhythmic action is the rule in the lowest forms of animal life; the beautifully regular motions of some Algæ, Diatoms and Oscillatoriæ, of the Infusoria, etc., are certainly not due to ganglia—not the least vestige of a ganglion can be traced in the snail's heart; and it would be hard to decide in what respect the beating of the snail's heart differs, on the one hand, from that of the pulsatile vessels of the Infusoria, or, on the other, from that of the mammalian heart. This being the case, why, Mr. Romanes asks, should the rhythmic action of the latter be referred to the ganglia present in it? Does it not seem probable that those contractile tissues endowed with rhythmic action in the higher animals are those which have retained their primitive endowment of rhythmicality? The paralyzed nectocalyces of Medusæ yield a rhythmic response to stimulation, whether electrical, mechanical or chemical, but while the covered-eyed Medusæ respond most readily to faradaic stimulation, some of the naked-eyed Medusæ are acted on most powerfully by the constant current, as well as by mechanical and chemical stimulation. The effect of temperature upon the rate of contraction exhibited by tissues deprived of their ganglia (artificial rhythm) was exactly parallel with its effect upon the natural rhythm of the motions of the unmutilated tissues, and this leads up to the probability that the effects of temperature on the natural rhythm of the ganglio-muscular tissues of other animals are for the most part exerted on the contractile element instead of on the ganglionic.

The introduction of oxygen gas into the water containing the parts under the action of electrical stimulus, increased the rate of contraction, while carbonic acid gas diminished it. The removal of the periphery of the swimming-bell of Sarsia, with its accompanying ganglia, causes great elongation of the polypite. The same thing occurs in some other Medusæ, but to a less extent. Thus the polypite is normally in a state of tonic muscular contraction from the persistent ganglionic stimulation, while the bell, under the same stimulation, exhibits rhythmic action. This difference is believed to result from the greater irritability of the polypite, which is evident in whatever way a stimulus is applied. But as the artificial rhythm induced by stimuli is but a feeble substitute for the vigorous movements of the healthy animal, Mr. Romanes concludes that the ganglionic discharges are timed to coincide with the rhythmic action of the contractile tissues, due to alternate exhaustion and restoration of excitability, and thus nervous energy is economized. Thus, in creatures not possessed of ganglia, rhythmic action results alone from this alternate exhaustion and restoration of muscular excitability, causing the constant stimulation to alternately fall below and rise above the limits of adequacy.

OVA OF ECHIDNA HYSTRIX.—Professor Owen has examined the ova of two specimens of *Echidna hystrix* as they occurred *in situ*. The ova increase in size prior to embryonal development, attaining a diameter of six millims., but evidence of the viviparity of the animal is found in the commencement of the fissure of the germ-mass. Previous observations have proved that the teatless mammary glands acquire large development during gestation, and that the lacteal aureola becomes lodged in a tegumentary depression or *quasi* pouch, capable of receiving the head and fore limbs of the young when this is not more than one inch ten lines in length.

ZOOLOGICAL NOTES.—Professor Haeckel has returned from his expedition to Ceylon, and has sent over fifty cases of specimens to Jena. His researches on the Ceylon coral reefs were highly successful.——M. Thury has published a hypothesis on the origin of species in the Archives des Sciences Physiques et Naturelles, Feb. 15.——In a recent communication to the French Academy, M. Huet records the discovery of segmental organs in certain isopod Crustacea.——It appears, says *Nature*, that Mr. Arthur having lately examined trout introduced into New Zealand from eggs originally obtained from the Thames, England, found that the annual increase of weight had risen from 1½ to 2½ pounds, and an example had been seen weighing twenty pounds. The cœcal appendages, hitherto held as significant of species were found increased from thirty-three to fifty, as exemplified in British fish, to from forty-three to fifty-four in the New Zealand examples, showing that these organs are inconstant as to numbers. These fish, moreover, living in different streams in New Zealand, had also assumed local peculiarities of size and change of form.——The U.S. Fish Commission is issuing the first volume of its Bulletin; the pages received contain, among others, some excellent articles by Mr. J. A. Ryder, on the breeding habits and development of the four-spined stickleback, the Spanish mackerel, the shad and the sea-horse (*Hippocampus antiquorum*). He states that the bony fishes differ in their mode of development from other vertebrates and fish-like animals except the sturgeons, in having a persistent segmentation-cavity which extends under the head to form the heart. The true gastrula of Teleosts appears to originate as an invagination at the tail of the embryo, represented by Kupffer's canal, essentially the same as in Amphioxus, and is not homologous with the gastrula regarded as such by Haeckel. The paired fins originate from lateral folds, and the first skeletal elements of the breast fins in the cod are a pair of curved cartilaginous arcs or rods.